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Glauca remane from Colorado + Kansas.

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OBSERVATIONS ON LLAMA REMAINS FROM COLORADO AND KANSAS

By F. W. CRAGIN, Colorado Springs, Col.

Restricting the genus, *Auchenia*, to llama-like forms having the premolar formula $\frac{2}{1}$, and considering that the dentition of *A. californica* (Leidy) is unknown, the transfer of *A. hesternus* (Leidy) to the genus, *Holomeniscus*, which Cope* has suggested on the ground of the probable absence of Pm. 3,† has rendered it doubtful whether any of the west American *Camelidae* belong to *Auchenia* proper.

I am indebted to Mr. R. C. Hills, for opportunity to study the remains of a cameloid form obtained by him from volcanic ashbeds on a small tributary of the Huerfano river, in Huerfano county, Colorado. These remains, which are now deposited in the cabinet of the Colorado Scientific Society at Denver, include considerable portions of both maxillaries and mandibles and more or less perfect contained teeth, with various other parts of the skeleton, and pertain to a true *Auchenia*, the molar dentition presenting the formula Pm. $\frac{2}{1}$, M. $\frac{3}{3}$.

I was at first inclined to identify this *Auchenia* with *A. hesternus* Leidy; but geographical and some other considerations seem to render it more probable that Cope's identification of the maxillary in the Condon collection from the Oregon desert with that species is correct; and it is certain that that maxillary, as described, represents a different species from the Huerfano county *Auchenia*, whether Cope's inference of the absence of Pm. 3, and his consequent reference of the specimen to the genus, *Holomeniscus*, be justifiable or not.

The Oregon desert maxillary is described as having the Pm. 4 anteriorly attenuated, and this to such an extent as to render it "almost certain that there was no third premolar in front of it." In the Huerfano specimen, there is a well developed two-rooted antero-posteriorly elongate Pm. 3, while the large three-rooted Pm. 4 is two-rooted anteriorly and has its crown in the form of a quadrate prism, the grinding surface presenting a single large crescentic lacuna. In form, the third and fourth superior pre-molars thus have some general resemblance to those of *Procamelus occidentalis*.

*Extinct Mammalia of the Valley of Mexico, p. 17.

†Inferred from the anteriorly attenuated Pm. 4 in a superior maxillary fragment from the Oregon desert, believed by Prof. Cope to pertain to *hesternus*.

In the Oregon maxillary, the posterior palatal foramen "issues opposite the fourth premolar's internal root." In the Huerfano specimen, it opens opposite the anterior part of the posterior root of the first true molar, or opposite the middle of the molar.

In comparing the Huerfano specimen with Leidy's type of *A. hesternus*, it will be noticed that the fourth inferior premolar in the former is, relatively to the adjacent first molar, larger than in the latter, and that, in form, it more closely approximates a triangular prism or wedge; features which are apparently only in part due to the somewhat more worn condition of the premolar of the Huerfano specimen, by reason of which condition, however, the lacuna of the grinding-surface is closed instead of being open posteriorly as in *hesternus*.

The strongly recurved posterior fifth lobe of the last upper molar, in the Huerfano specimen, is but moderately developed; for, though the tooth has reached a more advanced stage of wear than has the last *lower* molar of Leidy's type of *hesternus*, it does not contribute to the area of the grinding-surface, but becomes obsolete before reaching the plane of the latter.

Whatever may be the final generic disposal of the Californian *hesternus*, and of the Oregon desert maxillary, the present specimen is a true *Auchenia*. It lacks, however, the "compression-folds" seen on the lower molars of recent llamas. Its size was closely approximate to that of (*Holomeniscus*) *hesternus*, from which the available data indicate that it is probably distinct. The species may be known as *Auchenia huerfanensis*.

I append the following measurements:

	Inches.
Mandible, from symphysis to posterior border (latter taken at three inches below infra-condylar hook)....	15.
Elevation of summit of coronoid process above inferior border of mandible.....	12.
Depth of mandible at postsymphyseal constriction....	1.8
Same at posterior edge of alveolus of first true molar..	2.8
Inferior post-canine diastema.....	3.8
Antero-posterior diameter of grinding surface of second true molar.....	2.
Transverse diameter of same.....	1.125
Antero-post. diam. grind'g surf. third true molar.....	1.5
Transverse diameter of same.....	1.18
Major diameter of acetabulum.....	2.75
Minor diameter of acetabulum.....	2.5
Breadth of cannon-bone at distal extremity.....	3.6
Length of first phalanx.....	4.4
Breadth of same at proximal extremity.....	1.62
Breadth of same at distal extremity.....	1.25

Some cameloid remains obtained by Mr. E. D. Smith and the writer, from loess-marked volcanic ash-beds southwest of Meade Centre, Kansas, are also apparently referable to *Auchenia huerfanensis*. Most of these, including a second or third lower molar, vertebral and femoral epiphyses, etc., pertain to a young animal, but there is a proximal half of a first phalanx which, placed side by side with the first phalanx of the type of *Auchenia huerfanensis*, tallies with it perfectly in size and proportions.

A canine with gently curved, conical, and bicarinate crown, found with this phalanx, and which, therefore, may belong to the same species, or even individual, has the enamel thick and smooth on the outer, longitudinally grooved or striated on the inner face. The axis of its crown makes nearly a right angle with that of its root, indicating a long post-canine diastema. The two strongly compressed and elevated carinae are formed largely (their crests entirely) of the thick enamel-layer of the outer face, and are inwardly recurved.

The length of the rectified canine, as preserved, is about two inches—to which perhaps a fourth of an inch should be added for the tip, which is broken off. The length of the root is 1.1 inch. The transverse diameter at base of crown is .4 inch; the antero-posterior diameter at same, about 5.5. The height of the posterior carina at base of crown is about .1 inch, that of the (broken) anterior carina being apparently a little greater.

The capacious shovel-shaped crown of a lower incisor found with the preceding, and marked with a semicircular depressed area on the distal half of its upper face, may or may not belong to this or another *Auchenia*. It is a first or "pincer," canine, and its maximum or anterior width is .75 inch. The rather thick enamel of the front or lower face of this tooth is marked with fine undulating striaform grooves as in the incisors of the ox.

A cameloid metapodium from "old river gravel" at Denver, Colorado, and two first phalanges from the "Denver loess," collected by Prof. Geo. L. Cannon, indicate animals somewhat larger and stouter than those indicated by any of the remains above noticed, but which, as their teeth are unknown, cannot yet be determined.

The metapodium is 14.13 inches in length and, distally, 3.8 inches in breadth, the articular extremities, as well as the shaft, being stouter, in relation to the metapodium of *Auchenia huer-*

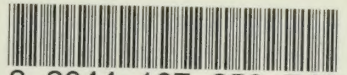
fanensis, than the relative breadths of the two specimens would indicate. One of the first phalanges has a length of 4.6 inches, a breadth proximally of 1.75 inch, and distally of 1.5 inch. The other, represented by the proximal half only, has a maximum breadth of fully 2.13 inches. These phalanges are not stout throughout, but expand somewhat suddenly from a comparatively narrow cylindrical shaft to the upper extremity.

The volcanic ash-beds which have yielded the type of *Auchenia huerfanensis* are regarded by Mr. Hills as Pliocene. Teeth of *Equus*, too much worn to admit of identification, occur in the same deposits, which in all probability represent the "Equus beds." But whether all of the so-called "Equus beds" belong in reality to one epoch, is a matter still to be determined.

In his monumental work on Lake Bonneville,* Prof. Gilbert has produced evidence which seems to definitely establish the fact that some of the "Equus beds" are Quaternary. On the other hand, Mr. Hills finds the ash-beds of the upper Huerfano drainage overlaid with a conglomerate which he provisionally believes to be identical with conglomerates not far distant, and which are overlaid by true morainal deposits.

The results of further field-work, which Mr. Hills hopes to prosecute in quest of the solution of the age of the Huerfano volcanic ash-beds, will be awaited with interest by all students of stratigraphic geology.

*Monograph I, U. S. Geological Survey, 1890, chapters vi and ix.



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